

# Davidson's Test

Donald Davidson's Critique of the Turing Test as an Expression of  
his Theory of Intellectual and Linguistic Competence

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## **Abstract**

In his essay 'Turing's Test' ([1990b] 2004), Donald Davidson

## **Keywords**

Donald Davidson, Philosophy of Mind, Philosophy of Language,  
Epistemology, Interpretation, Turing Test, Artificial Intelligence

# Contents

<b>1</b>	<b>Introduction</b>	<b>3</b>
<b>2</b>	<b>The Turing Test and Its Relevance</b>	<b>3</b>
2.1	Interpretations and Versions of the Turing Test . . . . .	4
2.2	Relevance of the Test and the Turing Principle . . . . .	5
2.3	Turing on Machine Learning . . . . .	6
<b>3</b>	<b>Davidson's Critique of the Turing Test</b>	<b>8</b>
3.1	Relevance of Turing's Test for Davidson . . . . .	8
3.2	Davidson's Critique of the Turing's Test . . . . .	9
3.3	Davidson's Proposal for a Modified Test . . . . .	10
<b>4</b>	<b>Conditions for Linguistic Competence</b>	<b>10</b>
4.1	The Distinction between Linguistic Competence and Performance	10
4.2	Recursiveness and Empirism . . . . .	11
4.3	The Social Aspect of Language . . . . .	11
4.4	Anti-Conventionalism . . . . .	11
4.5	The Triangular Nature of Knowledge . . . . .	12
<b>5</b>	<b>Davidson's Theory of Intellectual and Linguistic Competence</b>	<b>13</b>
5.1	Sources for Davidson's Theory of Intellectual and Linguistic Competence . . . . .	13
5.2	Outline of the Unified Theory . . . . .	14
5.3	Relation to Davidson's Test . . . . .	15
5.4	Possible Objections against Davidson's Test . . . . .	15
<b>6</b>	<b>Conclusion</b>	<b>15</b>
6.1	Prospects of Davidson's Pragmatic Theory . . . . .	15
6.2	Implications for Artificial Intelligence and Computer Linguistics .	16
	<b>References</b>	<b>17</b>

# 1 Introduction

## 1.0.1 Historic background to of Davidson’s Philosophy

- Vienna Circle and Empiricism
- Wittgenstein and the social aspect of language
- Quine and the new non-empiricist analytical philosophy
- semantic vs. foundational theories of meaning
- brief overview of players

## 1.0.2 Overview of Paper

- What is the Turing Test and why is it still interesting
- How can we understand Davidson’s Critique of the Turing Test
- How is Davidson’s proposal for a modified test related to his Unified Theory
- How well does Davidson’s Test hold up against objections?
- What can Computer Linguistics and Artificial Intelligence learn from Davidson’s Test

# 2 The Turing Test and Its Relevance

First we will have to explore what the Turing Test is. Turing proposed his famous test first in (1950) as a replacement for the question “*Can machines think?*” — which he deemed to vague to deserve discussion. The test is described as a game: the imitation game.

The imitation game consists of an interrogator that can communicate via a real-time text chat interface with two players. One player is a computer the other a human. The interrogator’s task is to identify the human after a given time. The computer’s task is to pretend to be a human<sup>1</sup> and the human’s task is to help the interrogator identify him correctly. If many interrogators consistently can’t tell the computer apart from the human — as measured against an established baseline<sup>2</sup> — we ought to take this as an indication that the computer can think. (Turing 1950, 433–434)

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<sup>1</sup>I think it is pretty clear that Davidson misinterprets Turing on the sexist aspect of the test (see Davidson [1990b] 2004, 78). Turing didn’t mean that the interrogator’s task would be to decide on the gender, and the computers task to imitate a woman. This becomes pretty clear when Turing says: “*If the man were to try and pretend to be the machine [...]*” (Turing 1950, 435) and from all his examples that are focused on how the machine can imitate being a human not a woman. See also (Copeland 2000, 526).

<sup>2</sup>Turing’s idea is that a baseline is established by the traditional imitation game, in which a man tries to imitate a woman and the interrogator has to decide on the gender. While this might not be the best way to establish a baseline it means that Davidson’s critique that “*Turing does not say what he would make of a computer that was consistently chosen over the [... human] to be the [... human]*” (Davidson [1990b] 2004, 78), is ill conceived, as the computer will always unambiguously fall over or under the baseline within a margin of error.

## 2.1 Interpretations and Versions of the Turing Test

But the interpretations are not as straight forward, as it might seem. The main question is what the Turing Test is supposed to be. There are three main interpretations:

1. The Turing Test is taken as an operational definition — a sufficient and necessary condition — of intelligence: Something is intelligent<sup>3</sup> if and only if it passes the Turing Test. (For Example See Millar 1973)
2. The Turing Test is taken as a sufficient condition of intelligence: Something is intelligent if it passes the Turing Test. But it is not necessary for something to pass the Turing test in order to be intelligent.
3. The Turing Test is taken “as a potential source of good inductive evidence for” intelligence: If Something passed the Turing Test one would be justified for inductively inferring that it is intelligent. (Moor 1976, 249, 251)

The first interpretation and any reading of intelligence in a broader sense are clearly not in line with Turing’s ideas, but the interpretation of the imitation game as a test clearly is. This becomes clear from the following section of a radio interview ([1952] 1999), which might well represent the simplest expression of the Turing Test:

*“I don’t want to give a definition of thinking [...] I don’t really see that we need to agree on a definition at all. The important thing is to try to draw a line between the properties of a brain, or of a man, that we want to discuss, and those that we don’t. [...] I would like to suggest a particular kind of test that one might apply to a machine. You might call it a test to see whether the machine thinks, but it would be better to avoid begging the question, and say that the machines that pass are (let’s say) ‘Grade A’ machines. The idea of the test is that the machine has to try and pretend to be a man, by answering questions put to it, and it will only pass if the pretence is reasonably convincing.”* (Turing [1952] 1999, 470–471)

In this simplified version of the test there is no second human player. While this might be limiting for a quantitative analysis, it ensures the focuses on the main question and removes any undue emphasis on strategy. The simplified version that Davidson proposes for discussion is basically identical except for the fact that Davidson proposes that *“the interrogator [...] should] be asked to decide whether or not the object is thinking.”* ([1990b] 2004, 81) If we assume that any bias against the object’s ability to think can be removed, this seems to

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<sup>3</sup>The term intelligence is adopted here purely in reference to Artificial Intelligence. Davidson (1995) mostly uses the term rationality to refer to the concept that this thesis is concerned with and I will introduce and explicate the term intellectual competence for this in section 4.1.

be the clearest expression of Turing’s idea and is therefore the version we will refer to in the following.

It also becomes fairly clear that a reading in Moor’s third sense does Turing most justice. But where does that leave the relevance of the Turing Test?

## 2.2 Relevance of the Test and the Turing Principle

The main challenge of the field of so called *Artificial General Intelligence* (AGI) is to give a clear definition of its topic. Unlike other propositions for an operational definition<sup>4</sup> of AGI, the Turing Tests provides a clear and well justified empiric goal.

*“there are two strong arguments why the Turing test is a good format for gathering inductive evidence. First, the Turing test permits direct or indirect testing of virtually all of the activities one would count as evidence for thinking. Secondly, the Turing test encourages severe testing. [...] the computer would be tested in detail over a wide range of subjects [...] and] the interrogator’s goal is to find a refuting instance which gives the computer away.”* (Moor 1976, 251–252)

Critics mostly fall into two camps. The first point Moor provides is aimed against the first type of critics that suggests the test sets the wrong goal. As Moor argues communication is a very clear framework to investigate all kinds of thinking. A further pragmatic reason for the relevance of the Turing Test I would add is: Natural language communication provides a good gold standard for completely general and seamless interfaces. Many of those critics mistake the question as philosophic while it is best treated definitional. Computer Scientists ought not to be concerned with defining intelligence in general but with a good definition for “*Grade A*” computers — to use Turing’s terminology. In this regard the interpretation of the Turing Test as a framework to gather empiric evidence can be set as a clear definition of the goal of AGI.

The other type of critics questions the adequacy of the test to determine whether its goal is reached. Moor’s second point is aimed against that by pointing out how well the test encourages thorough testing. The critics sometimes mistake Turing’s predictions as a specification that the Test ought to take only 5 minutes and limited implementations of the Turing Test that favor engineering tricks like the Loebner Prize<sup>5</sup> discredit Turing’s intentions. I agree with Copeland’s

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<sup>4</sup>See (Muehlhauser 2013) for a brief overview of operational definitions of AGI, including the coffee-brewing test and college test.

<sup>5</sup>Shieber (1994) criticizes the Loebner prize for its inappropriateness to award advances in natural-language-processing techniques instead of engineering tricks oriented to the exigencies of the restricted task like parrying and insertion of random typing errors. But the setup of the scoring system alone shows how pointless it is to even judge current systems by a direct Turing Test.

interpretation of Turing: The goal the test sets is a computer that “*plays the imitation game successfully come what may, with no field of human endeavour barred, and for any length of time commensurate with the human lifespan.*” (Copeland 2000, 530)

### 2.2.1 Turing’s Three Main Claims about Artificial Intelligence

- Turing supports the fact that a universal computer can simulate every physical process including the brain. (also known as the Turing Principle, Wikipedia)
- Turing believes that communication is a suitable means to expose the relevant intellectual abilities that determine whether a machine can think.
- Turing thinks the imitation game specifically is suited to test the communicative abilities of the computer.

We have established that:

1. Turing sees communication as suitable to expose the relevant intellectual abilities that determine whether a computer can perform tasks on par with a human being.
2. Turing thinks that his test specifically can determine whether a computer possesses such communicative abilities.

But there further is a third claim. (Copeland 2000, 530) Which is known as the Turing Principle<sup>6</sup>:

3. Turing believes that universal computers can simulate any physical process including the brain.

This is implicit in [Turing:1950cm] and most clearly expressed in (Turing [1951] 1999, p. ???): “*If it is accepted that real brains, as found in animals, and in particular in men, are a sort of machine it will follow that our digital computer suitably programmed will behave like a brain.*”

This is a much more controversial claim of course and — as Turing is well aware — he has few arguments and less evidence for it. It is important however to realize this as a separate and fully independent claim from the others.

## 2.3 Turing on Machine Learning

### 2.3.1 State of Passing the Test

- Loebner Prize

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<sup>6</sup>This is also known as the Church–Turing–Deutsch principle and represents an extension of the well known Church–Turing thesis to artificial intelligence.

- Turing’s predictions
- reverse engineering approach to AI with neural networks most successful
- Machine Learning

The last statement is actually quite interesting from a modern perspective as it neural networks

==> Machine Learning prediction

While Turing believed that by the turn of the century there would be computers that “play the imitation game so well that an average interrogator will not have more than 70 per cent chance of making the right identification after five minutes of questioning.” (1950, 442) Recent winners in the Loebner prize (AISB, n.d.), which is awarded to the most humanlike chatbot judged by a Turing inspired Test, show how far we still are from Turing’s vision — even though the Loebner prize contestant might not represent the state of the art of natural language<sup>7</sup>.

Turing’s wrong prediction of the development can be mainly accredited to his underestimation of the needed processing power for Machine Learning (1950, 455). Recent accomplishments with deep neural networks for example have only become feasible because computers are able to run networks with millions of neurons in real time.<sup>8</sup>

### 2.3.2 Machine Learning and AGI

- Move from AGI to AI and Machine Learning
- Simulation of the Brain and Neural Networks

Unlike the obsession in popular culture with human-like artificial intelligence might suggest, the interest of Computer Scientists in the last years has been more focused on domain specific intelligence for specific applications (most notably: image recognition, domain specific language processing, and robotics). The field of *Artificial Intelligence* (AI) is concerned with such weak AI which is contrasted with the term *Artificial General Intelligence* (AGI) which refers to the field concerned with human like strong AI.

<sup>7</sup>Shieber (1994) criticizes the Loebner prize for its inappropriateness to award advances in natural-language-processing techniques instead of engineering tricks oriented to the exigencies of the restricted task like parrying and insertion of random typing errors. But the setup of the scoring system alone shows how pointless it is to even judge current systems by a direct Turing Test.

<sup>8</sup>Steven Wolfram writes: “Computers (and especially linear algebra in GPUs) got fast enough that [...] it became practical to train neural networks with millions of neurons, on millions of examples. [...] this suddenly brought large-scale practical applications within reach. [...] I don’t think it’s a coincidence that this happened right when the number of artificial neurons being used came within striking distance of the number of neurons in relevant parts of our brains. [...] if we’re trying to achieve “human-like” image identification [...] then this defines a certain scale of problem, which, it appears, can be solved with a “human-scale” neural network.” (2015)

Machine Learning, neural networks, statistical methods

reverse engineering approach to AI with deep neural network has yielded

### 2.3.3 Turing on how to device a machine that can pass the test

- child mind with learning ability
- sensory organs
- interaction with teacher
- Helen Keller example

### 2.3.4 Summary and Conclusion

- We are right in taking the simplified version of the test as the purest expression of Turing's idea
- The tests relevance is mainly that it provides the clearest answer to what AGI is about.
- Turing has rightly identified the main question of research in AGI to be about how a machine can learn to communicate.

## 3 Davidson's Critique of the Turing Test

### 3.1 Relevance of Turing's Test for Davidson

#### 3.1.1 Why the test is interesting to Davidson

- Test is concerned with the nature of thought
- Pragmatic approach to the question of thought
- Empiric criterion for thought
- Not confined to machines

*"The whole thinking process is still rather mysterious to us, but I believe that the attempt to make a thinking machine will help us greatly in finding out how we think ourselves."* (Turing [1951] 1999, p. ???)

*"the test is designed to throw light on the nature of thought."* (Davidson [1990b] 2004, 78)

*"I believe that another human being thinks because his ability to think is part of a theory I have to explain his actions. [...] the evidence for the theory comes from the outward behavior of the person. [...]"*



*there is no reason why knowledge of computer thinking can not arise in the same way. I can use the computer's behavior as evidence in assessing my theory about its information processing. In neither the human case nor the computer case must I consider the thinking to be on a close analogy with my own, for the evidence might dictate that the human or computer discriminates and evaluates quite differently than I do."* (Moor 1976, 251)

### 3.1.2 Where does Davidson agree

- There should be an empiric test for intellect
- Linguistic competence is essential for intellect
- General/Strong AI might well be possible
- Davidson sees no argument why AI shouldn't be possible
- AI through Brain simulation should be possible
- See also 'Representation and Interpretation' (Davidson [1990a] 2004)
- No need for introspection into working of mind (against Searle's chinese room)

Turing's proposed test shows that he agrees with Davidson on the fact that linguistic competence is essential to intellect. And I think we also have to interpret Davidson and Turing as agreeing that there is a scientific approach that can describe essential parts of our linguistic competence. In the case of Turing this is evident in his belief that there is a program that allows the computer to win the imitation game. For Davidson it is evident in his proposal of the empiric Unified Theory that can capture the essence of linguistic competence and rationality. We will investigate Davidson's ideas further in [Unified Theory of Understanding].

## 3.2 Davidson's Critique of the Turing's Test

### 3.2.1 The core argument: knowledge comes from interaction in shared world

- Rejection of sharp distinction between mental and physical (especially sensory) abilities (E4.5)
- distinction between semantic and syntactic abilities (+E5.8)
- Relation to Agreement between Descartes and Turing
- Both come from the idea that knowledge is simply in the head
- Even Turing's Helen Keller example lacks as she was interacting with the world through touch.
- Connected to rejection of Cartesian Epistemology

### 3.2.2 Does Davidson’s Critique Do Justice to Turing?

- Davidson has a good point
- but he doesn’t do justice to Turing’s thoughts on Machine Learning that would deserve a discussion in his paper

## 3.3 Davidson’s Proposal for a Modified Test

### 3.3.1 Observe a History of interaction with the world

- The ability to determine non predefined meaning is essential for intelligence

### 3.3.2 Summary and Conclusion

## 4 Conditions for Linguistic Competence

### 4.1 The Distinction between Linguistic Competence and Performance

#### 4.1.1 Distinction between sufficient and necessary conditions of linguistic competence

- relation to term linguistic competence and linguistic performance
- analogy to physics not being able to describe actual natural systems but only systems under ideal conditions
- See (E4.8, E5.8)

I use the term *linguistic competence*<sup>9</sup> here to refer to Davidson’s idea of the essential aspect of understanding language vs. the practical understanding of language.

#### 4.1.2 Relation to Davidson’s Philosophy

- truth conditions as a formal language
- Unified Theory, Radical Interpretation
- Successful Communication & Anti-Conventionalism & Holism of knowledge

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<sup>9</sup>The term linguistic competence was introduced by Chomsky who makes a “fundamental distinction between competence (the speaker-hearer’s knowledge of his language) and performance (the actual use of language in concrete situation)” (Chomsky 2014, 4). While Davidson criticizes the idea of linguistic competence as knowledge of a language, he adopts the term for the description of his theory that describes the interpreters essential competence in ‘A Nice Derangement of Epitaphs’ (1986).

## **4.2 Recursiveness and Empirism**

### **4.2.1 The Importance of Empirical Theories**

- No a priori knowledge about language(-learning), only empirical knowledge (E2.1)

### **4.2.2 Learnable Languages**

- Finite set of linguistic primitives gives rise to infinite linguistic expressions

‘Theories of Meaning and Learnable Languages’ (Davidson 1965)

## **4.3 The Social Aspect of Language**

### **4.3.1 The Primacy of Ideoloelect**

- relevance of interpretation rather than meaning (+E2.2)
- see similarities to Gadamer’s Hermeneutics of Wirkungsgeschichte (Bertram 2012)
- Relevance of Intention in communication (+E5.10)
- Arguments for primacy of ideoloect over language
- Malapropisms and the like (E5.7)

### **4.3.2 Why is language necessarily Social**

- Wittgenstein’s norm of actually getting it right in language
- also see language game analogy in anti conventionalism (2.18)
- and importance of distinction between true and false beliefs in triangulation (E3.14)
- Truth only determined trough communication
- see also Plato, socrates (E5.16)

## **4.4 Anti-Conventionalism**

### **4.4.1 arguments against conventionalism**

- impossibility of public sign for sincerity
- language game analogy (+E5.8)

#### **4.4.2 Remarks about how understanding does work**

- At the end of (1984), Davidson says that understanding can't be formally described
- Relation to distinction linguistic between competence and performance

### **4.5 The Triangular Nature of Knowledge**

#### **4.5.1 The basic problem of Epistemology**

- Distinctiveness of three types of Knowledge (subjective, intersubjective, objective) (E3.14)
- Three Questions of Epistemology (E3.14)
- how to know other minds
- how to know world
- how to know own mind without evidence

#### **4.5.2 Rejection of other Epistemologies**

- Rejection of Positivism (reductionism to world knowledge) (E3.14)
- Rejection of empiricist Epistemology (E3.14, E2.1)
- No primacy of names and predicates in the foreground of senses
- doesn't he contradict that in E2.9 and E4.8?
- Rejection of Cartesian Etymology (primacy of knowledge of one's own mind) (E3.14, E3.3, E3.13)
- Rejection of skepticism (E3.14, SEP Davidson, E4.1)

#### **4.5.3 The Process of Gaining Knowledge**

- Interdependency of three varieties of Knowledge
- Importance of distinction between true and false beliefs (E5.8, E3.14, E4.1, SEP Davidson)
- Principle of Charity (Coherence and Correspondence) (E3.14, E2.9, E3.14)
- Reaction to stimuli (E3.14)
- proximal vs. distal stimuli (E5.4)
- Iscrutability of Reference / Indeterminacy of meaning (Quine Word and Object, E5.3, E2.16, E3.14)

#### **4.5.4 The Underlying Ontology and Metaphysics**

- Ontology of only objects and events (E3.14, E5.4)
- Directness of knowledge of world
- no intermediary entities (E5.3, E5.4, E3.10)

- no mentales, language only through communication, meaning given causally by objects events (E5.9)
- Truth as elementary non-reducible concept (E5.2, E2.I)

#### 4.5.5 Anomalous Monism

- parallels to Spinoza's causal theory of affects (E5.20)
- see arguments for irreducibility of mental in Tirangulation (E3.14)
- Reasons for Irreducibility/anaomalism of Mental to Physical (E3.14, E4.8)
- Irreducibility of knowledge of belief to knowledge of world
- causal nature of the mental (+E1.11, E4.8)
- Missing independent mode of communication about mental theories (+E4.8)
- Turing's discussing of rule based behavior

Turing discusses an interesting objection to his test that is related to Anomalous Monism (1950, p 452f). If our behavior is not ruled by strict laws but a computer is. How could it ever simulate our behavior. Turing argues that this is simply an assumption (and even if who says that the mental states of a computer could for example not supervene on the states of its neural network). Turing uses cryptography as an example for a process where a computer can produce output which can not be tracked back to its originating rules (but this of course is a practical limitation not a theoretical one, since all cryptographic functions can be reversed with infinite processing power.)

This raises an important question whether the anomalism of the mental is connected to our linguistic competences (or maybe just to our effectiveness?) and how computers/the unified theory could account for it. *(need to reread in three varieties of knowledge)*

#### 4.5.6 Summary and Conclusion

## 5 Davidson's Theory of Intellectual and Linguistic Competence

### 5.1 Sources for Davidson's Theory of Intellectual and Linguistic Competence

#### 5.1.1 What is this theory of interpretation

- Anomalous Monism
- Davidson's Program
- Radical Interpretation

- Triangulation
- Unified theory of Thought, Action, and Meaning
- Prior and Passing Theories
- The social Aspect of language

So what is it that I am referring to when I speak about Davidson's theory of interpretation? While this seems like a straight forward question it is a little more complicated because of the distributed nature of Davidson's work.

Davidson's theory can be traced back to his rejection of meaning and idea that interpretation can be described as a process of 'translating' utterances into truth conditions based on assumptions about the beliefs of the speaker using the principle of Charity, which he develops in 'Truth and Meaning'<sup>10</sup> (Davidson 1967) and 'Radical Interpretation' (Davidson 1973).

## 5.2 Outline of the Unified Theory

### 5.2.1 Decision Theory

### 5.2.2 Representation of Meaning/Linguistic Content

- Meaning as Language (E3.14, E2.2) (not things in world, not entities sui generis)

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<sup>10</sup>His idea that truth conditions (T-Sentences) are all that is needed to explain interpretation, and any more fundamental notion of meaning is misconceived, has also led to what is known as Davidson's Program: The attempt to give an account of the interpretation of utterances purely with the means of first order logic.

### **5.2.3 How does the interpretation Process work**

## **5.3 Relation to Davidson's Test**

### **5.3.1 Interpreting Davidson's Test as a Test for a Unified Theory 'machine'**

### **5.3.2 Summary and Conclusion**

## **5.4 Possible Objections against Davidson's Test**

### **5.4.1 Behaviorism**

### **5.4.2 Mechanism**

### **5.4.3 Scope of the Test**

### **5.4.4 Blockheads**

### **5.4.5 The Chinese Room (Internal Operation)**

### **5.4.6 French: Associative Priming and Rating Games**

### **5.4.7 Ability to cope with Abstract Terms**

- It remains unclear how well Davidson's theory might be able to cope with abstract terms in the language.
- He throws very little light on how understanding of abstract terms might work.
- There are good reasons to doubt that communication about abstract terms can work in the same way as other communication. Something like the *Wirkungsgeschichte* becomes way more plausible, if we look at how culturally loaded language is
- See also Bertram's critique: Gadamer's idea

(Bertram 2012) (Davidson 1997)

### **5.4.8 Wirkungsgeschichte**

## **6 Conclusion**

### **6.1 Prospects of Davidson's Pragmatic Theory**

While Davidson is skeptical about the possibility of explaining our linguistic performance. He believes that there is a pragmatic and empirical theory about

the essence of linguistic competence.

## **6.2 Implications for Artificial Intelligence and Computer Linguistics**

Davidson tries to devise a theory that can model human intellectual abilities in an empiric theory that has the power to explain them. (As opposed to only a simulation of the brain by a machine)

While it currently seems more probable that Turing's Test and also Davidson's Test will be passed by a computer that leverages trained large scale deep neural networks aka. something into the direction of simulating the brain. Davidson's consideration still provide important input into what is needed to achieve human level of natural language abilities. That is the ability to somehow interact with the world and have some sensory impression of it and have a triangular model of determining world interaction.

### **6.2.1 Possibility of AI and the importance of Language**

- Davidson sees artificial intelligence as possible.
- He agrees that language is the key test for intelligence.

### **6.2.2 Important boundary conditions for linguistic competence**

- Linguistic and intellectual competence are inherently social/intersubjective
- Linguistic and intellectual competence require interaction with the shared world (empiric)

### **6.2.3 Denial of conventionalism and statistical linguistics**

- The social and empiric traits of linguistic and intellectual competence can not be modeled by conventionalism, if this convention requires a previously shared common practice. Interpretation emerges in the instance of communication and cannot be predetermined in anyway.
- Abilities of linguistic interaction can not be clearly separated from abilities for physical interaction. Both are necessary for intelligence.



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